Welcome EFDA-JET Visitors !

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February 22, 2001

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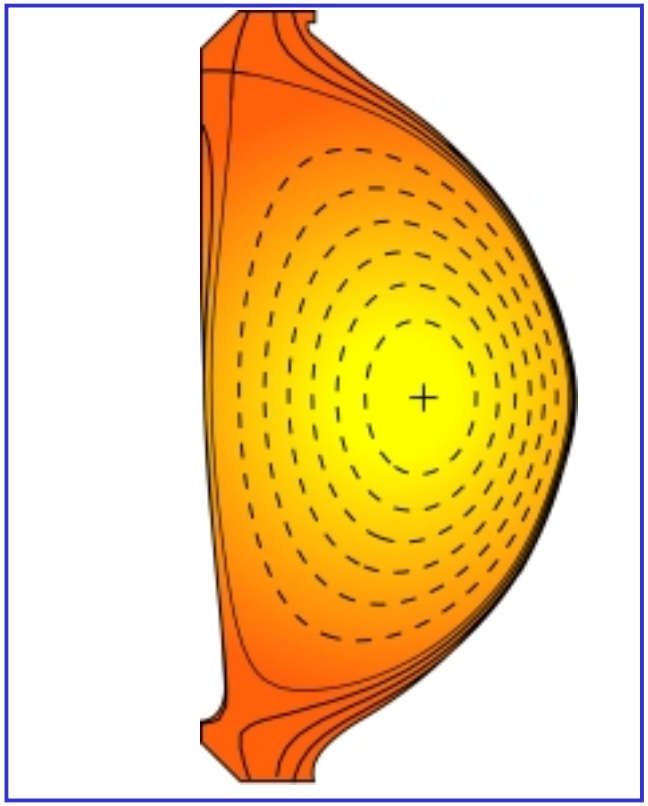
Plasma Science Challenges

Plasma Science, NRC Plasma Science Committee

- **Macroscopic Stability**
  - Maximize plasma pressure
  - Coronal mass ejections
- **Wave-particle Interactions**
  - Successful alpha heating
  - Cosmic ray isotropy
- **Microturbulence & Transport**
  - Energy confinement
  - Suppression of turbulence
- **Plasma-material Interactions**
  - First wall survivability
  - Materials processing



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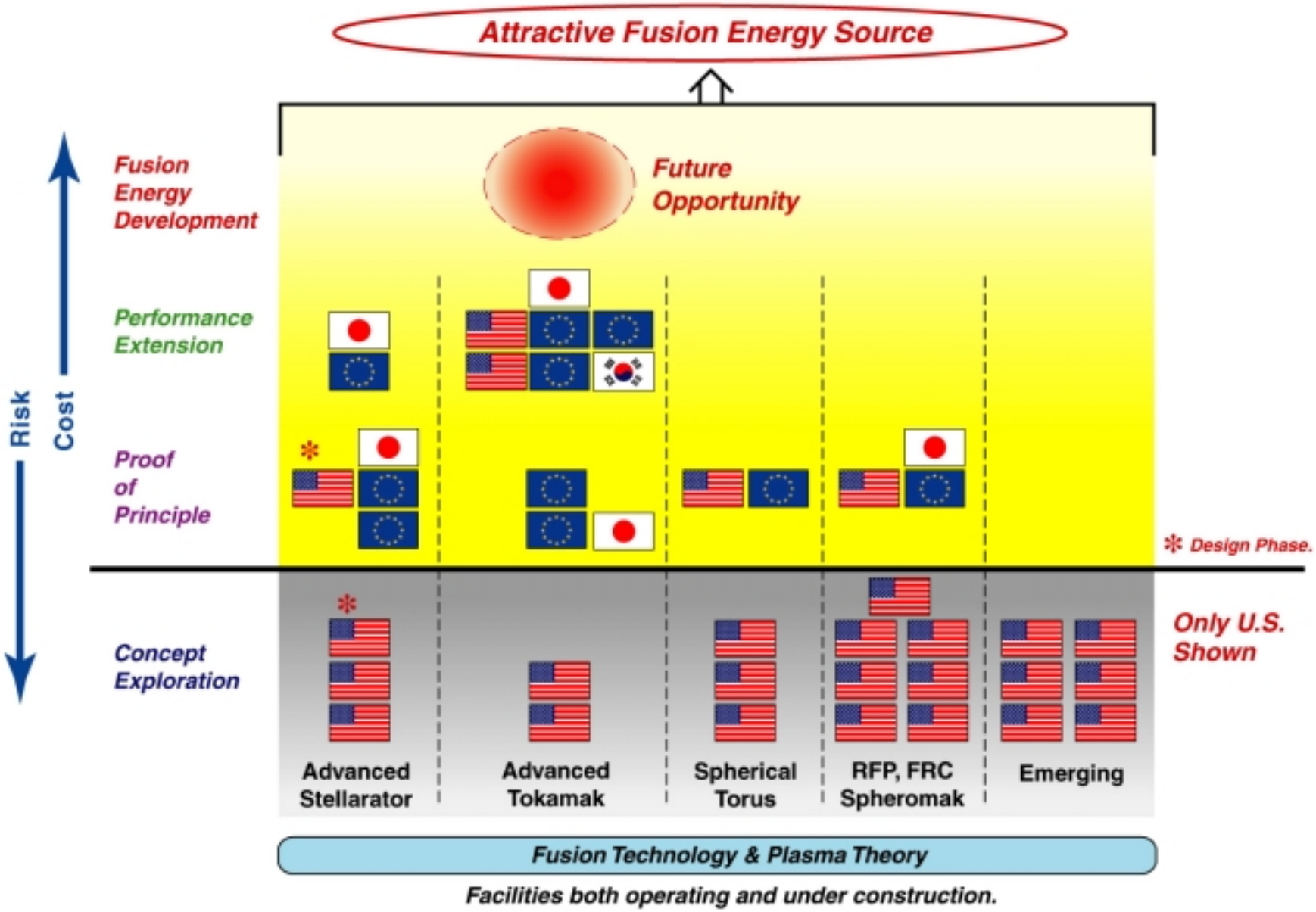
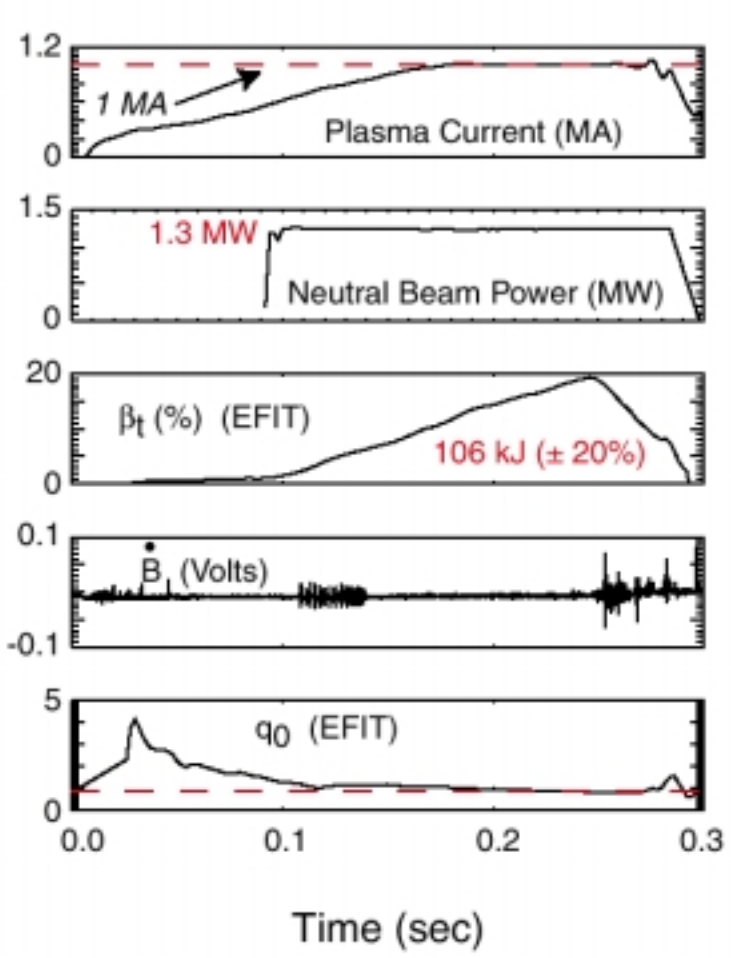
The Magnetic Fusion Energy Portfolio

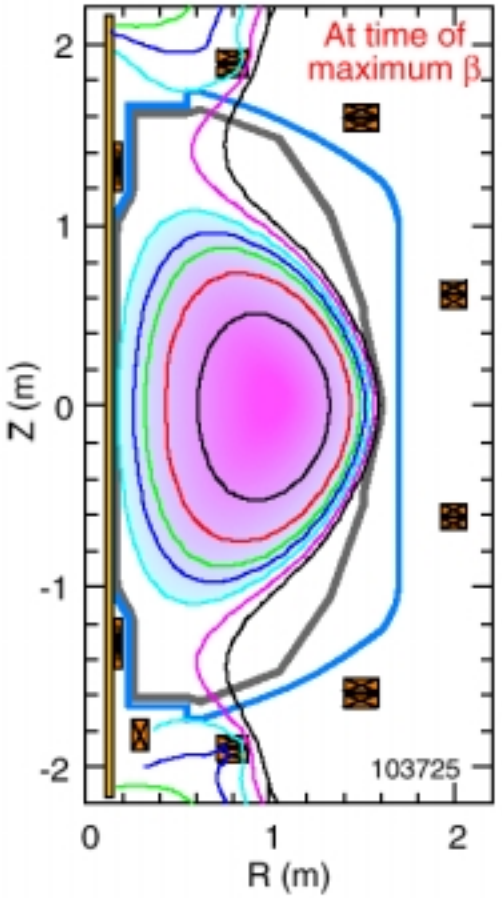


Facilities both operating and under construction.

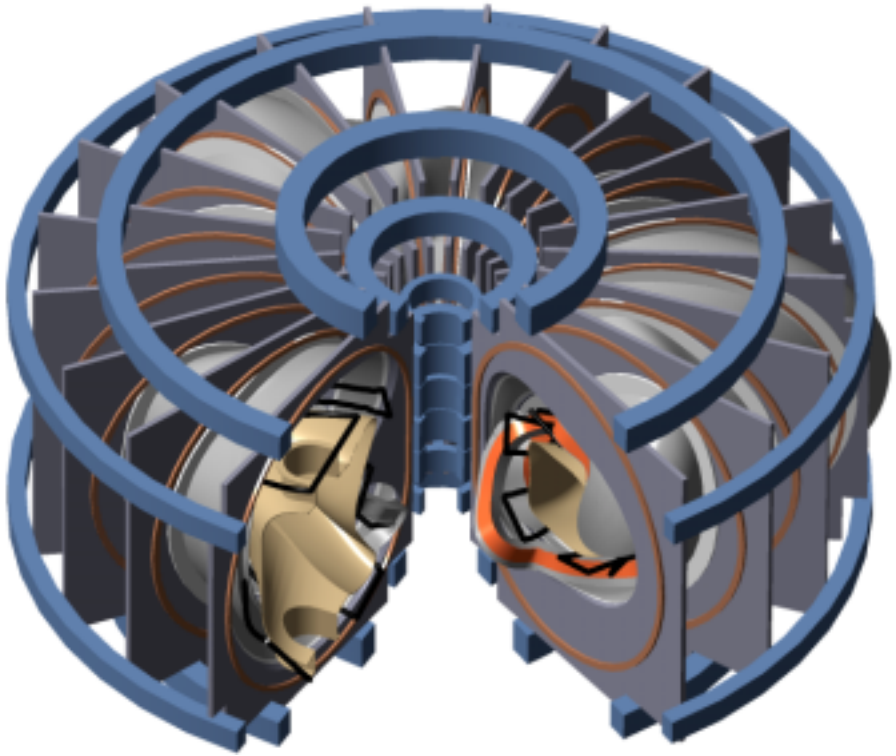
High-β_t With Good Confinement

$\beta_t = 2\mu_0 \langle p \rangle / B_0^2 = 19.7\%$, $\beta_n = 3.9$, $B_0 = 0.3$ T, $q_\psi = 7.5$





Compact Stellarators will Test Many Aspects of Fusion Science

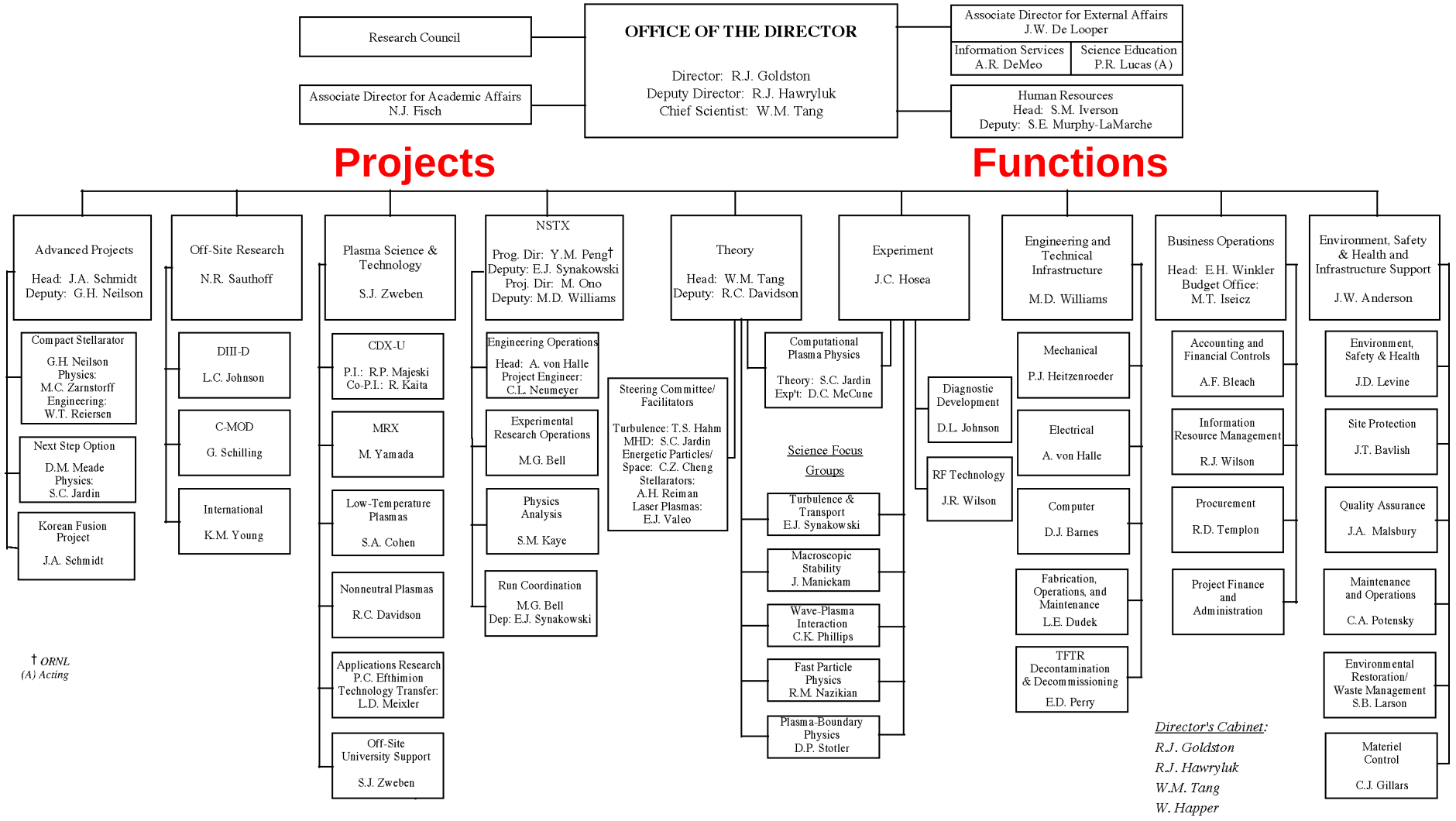


- **Macroscopic Stability:**
  - **When and why no disruptions? Why is β > theory?**
    ⇒ High β, 3-D stability to kink, ballooning, neoclassical tearing, vertical displacement.
- **Microturbulence and Transport:**
  - **Is quasi-symmetry effective at high Ti? Challenge Er shear understanding via ripple control.**
    ⇒ High Ti, flexible coil system
- **Wave-particle Interactions:**
  - **Do we understand 3-D fast ion resonances, *AE modes in 3-D?**
    ⇒ Good fast ion confinement
- **Plasma-boundary interaction:**
  - **Effects of magnetic stochasticity.**
    ⇒ High power, flexible coil system

Auburn U., Columbia U., LLNL, NYU, ORNL, PPPL, U. Texas, UCSD, U. Wisconsin

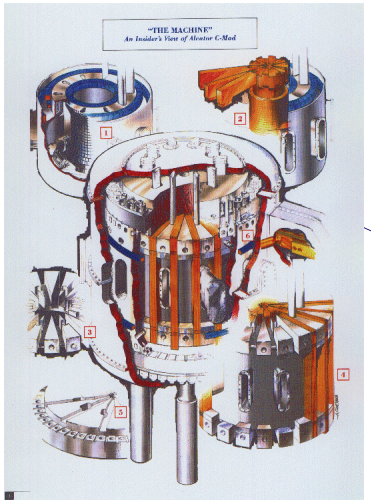
Australia, Japan, Germany, Russia, Switzerland

PPPL is Organized by Projects and Functions



May 1, 2000

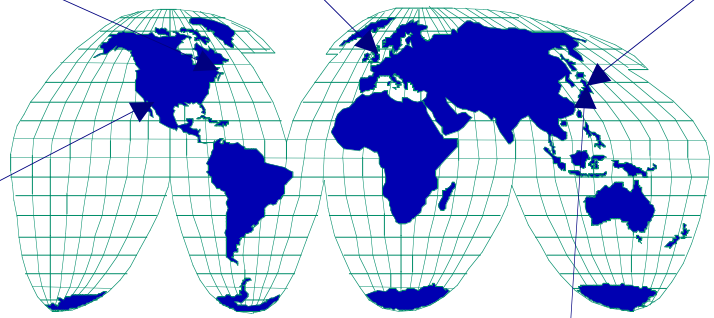
Major PPPL Off-Site Research Programs



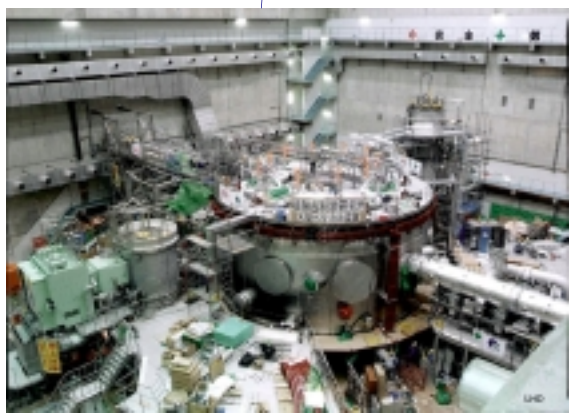
C-MOD, MIT, MA

JET, EU

JT-60U, JA



DIII-D, GA, CA



LHD, JA

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JET Offers Unique Opportunities for US – EU Collaboration

- **Largest tokamak in the world**
  - **Excellent heating and diagnostic capabilities**
  - **Exciting planned upgrades**
- **Excellent international research team**
  - **Very open to scientific collaboration**
  - **Well organized for off-site researchers**
- **DT Capability**
- ***Test-bed for Future International Collaboration***

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Exhortation

- Let's look for opportunities to enhance both the EU and the US fusion energy science programs through US-JET collaboration.
- Let's be realistic, so we succeed.
  - Scale of proposed collaboration
  - Balance between science and support
- For the world program to succeed, it is important that we succeed.

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